

## The Claims

What is claimed is:

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1. A system for performing a manufacturing operation relative to a first path comprising:
- a plurality of first carriages mounted for independent movement relative to a first path;
- a plurality of first active elements operatively associated with at least one first reactive element to produce relative movement between the first carriages and the first path, with each said first active element being independently activated to control such relative movement;
- 10 at least one controller for controlling the activation of said first active elements in order to provide independent control of at least one motion parameter of each said first carriage; and
- 15 a first tool associated with each first carriage for performing at least part of the manufacturing operation,
- wherein the active elements are selectively activated by the controller to independently direct the first carriages along the path so that the manufacturing operation
- 20 can at least partially be conducted by the first tool.
2. The system of claim 1, wherein the first carriages are movable and the first path is fixed, and the first path is a curvilinear path.
- 25 3. The system of claim 1, wherein at least one first reactive element is associated with each first carriage.
4. The system of claim 1, wherein the motion parameter is one or more of force, acceleration, velocity, direction, position, torque, or jerk.
- 30 5. The system of claim 1, wherein the first active elements are electrically conductive coils that are electrically insulated from neighboring coils and arranged along the first path, with each of said coils, when enabled, establishing an electromagnetic field that is

effective to influence said first reactive element when said first reactive element is associated with said electromagnetic field.

6. The system of claim 5, wherein the controller controls the enablement of  
5 respective ones of said coils as a function of the location of each first carriage along the first path so that each first carriage is independently controlled.

7. The system of claim 1, further comprising:  
at least one second path having a plurality of second carriages mounted for  
10 independent movement relative to the second path, said second carriages having associated therewith at least one motion parameter;  
a plurality of second active elements operatively associated with at least one second reactive element to produce relative movement between the second carriages and the second path, with each said active element being independently activated to control such relative  
15 movement;  
said at least one controller for controlling the activation of said second active elements in order to provide independent control of the at least one motion parameter of each said second carriage,  
wherein the first tool associated with each first carriage cooperates with the second  
20 carriage to perform the manufacturing operation.

8. The system of claim 7, wherein the first and second carriages are controlled to cooperate to conduct the manufacturing operation.

25 9. The system of claim 7, wherein at least one first reactive element is associated with each first carriage and at least one second reactive element is associated with each second carriage.

10. The system of claim 7, further comprising a second tool associated with said  
30 second carriage for cooperating with the first tool to perform at least part of the manufacturing operation.

11. The system of claim 7, further comprising a second controller, with the first controller controlling activation of said first carriage, and said second controller controlling activation of said second carriage.

12. The system of claim 11, wherein the first and second active elements are electrically conductive coils that are electrically insulated from neighboring coils and arranged along the first and second paths, with each of said coils, when enabled, establishing an electromagnetic field that is effective to influence the first and second reactive elements when the reactive elements are associated with the electromagnetic fields.

13. The system of claim 12, wherein the first controller controls the enablement of respective ones of said coils on the first path as a function of the location of each first carriage along the first path so that each first carriage is independently controlled, and the second controller controls the enablement of respective ones of said coils on the second path as a function of the location of each second carriage along the second path so that each second carriage is independently controlled.

14. The system of claim 13, wherein the first and second controller are a single controller.

15. The system of claim 7, further comprising at least one third path.

16. The system of claim 1, wherein the controller includes a multiplexer.

17. The system of claim 1, wherein more than one first carriage is provided and the first carriages are controlled independently from one another along the path.

18. The system of claim 1, further comprising:  
a plurality of second carriages mounted for independent movement relative to a second path; and

a plurality second active elements operatively associated with at least one second reactive element to produce relative movement between the second carriages and the second path, with each active element being independently activated to control such relative movement,

wherein the controller controls the activation of said active elements in order to provide independent control of the motion parameters of each said first and second carriages, and the first and second carriages are controlled to meet as they travel along at least a portion of the path so that the manufacturing operation can be conducted.

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19. The system of claim 18, further comprising a first tool associated with each first carriage for performing at least part of the manufacturing operation.

20. The system of claim 19, further comprising a second tool associated with each second carriage, wherein the first and second tools cooperate to perform the manufacturing operation.

21. A method for performing a manufacturing operation relative to a first path, comprising:

15 mounting a plurality of first carriages for independent movement relative to a first path;

operatively associating a plurality of first active elements with at least one first reactive element to produce relative movement between the first carriages and the first path, with each first active element being independently activated to control such relative movement;

20 associating a first tool with each first carriage for performing at least part of the manufacturing operation; and

controlling the activation of the first active elements to direct the first carriages along the first path where the manufacturing operation is at least partially conducted by the first tool.

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22. The method of claim 21, wherein the first carriages are movable and the first path is fixed, the first path is a curvilinear path and the first active elements are selectively activated to independently direct the first carriages along the first path.

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23. The method of claim 21, wherein each first carriage has at least one motion parameter and the motion parameter is one or more of force, direction, velocity, acceleration, position, torque, or jerk.

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24. The method of claim 21 for performing a manufacturing operation relative to first and second paths, further comprising:

mounting a plurality of second carriages for independent movement relative to a second path;

5 operatively associating a plurality of second active elements with at least one second reactive element to produce relative movement between the second carriages and the second path, with each active element being independently activated to control such relative movement; and

controlling the activation of first and second active elements in order to provide  
10 independent control of each first and second carriage so that the first and second carriages cooperate as they move along at least part of the path in order for the manufacturing operation to be conducted.

25. The method of claim 24, which further comprises associating a first tool with  
15 each first carriage and associating a second tool with each second carriage and controlling the first and second tools to cooperate to conduct the manufacturing operation.

26. The method of claim 25, which further comprises moving the first and second carriages in unison along the first and second paths as the first and second tools cooperate to  
20 conduct the manufacturing operation.

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